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Previous ONR Support

Contract: ONR-N00014-86-0219
Title: Research on Bispectrum Estimation
Period: April 1, 1986 - March 30, 1988
Principal Investigator: Chrysostomos L. Nikias

→ Significant results have been obtained during the first eighteen months of this research contract. We have ^{to} developed a new family of identification procedures for non-Gaussian white noise driven linear, time-invariant, nonminimum phase systems based on parametric modeling of higher-order cumulants using (i) non-causal AR, ^{Autoregression} (ii) forward-backward ARMA and (iii) cepstral modeling approaches. We have also developed ^{was developed} a new approach to time delay estimation in the presence of spatially correlated noise and have extended the results to a general array processing problem. The research productivity of this contract is summarized below:

A. Journal Publications

- A.1 C.L. Nikias and M.R. Raghuveer, "Bispectrum Estimation: A Digital Signal Processing Framework" Proceedings IEEE, Vol. 75(7), July 1987.
- A.2 C.L. Nikias, "ARMA Bispectrum Estimation to the Identification of Nonminimum Phase Systems," IEEE Trans. Acous., Speech and Signal Processing, Accepted for publication in May 1987, in press.
- A.3 R. Pan and C.L. Nikias, "The Complex Cepstrum of Higher-Order Cumulants and Nonminimum Phase Signal Reconstruction", IEEE Trans. Acous., Speech, and Signal Processing, accepted for publication in May 1987, in press.
- A.4 R. Pan and C. L. Nikias, "Phase Reconstruction in the Trispectrum Domain," IEEE Trans. Acous., Speech, and Signal Processing, Vol. ASSP-35 (6), pp. 897-900, June 1987.
- A.5 C. L. Nikias and H. H. Chiang, "Higher-Order Spectrum Estimation via Non-Causal Autoregressive Bispectrum and Deconvolution," IEEE Trans. Acous., Speech, and Signal Processing, submitted on May 4, 1987.
- A.6 C.L. Nikias and R. Pan, "Time Delay Estimation in Unknown Gaussian Spatially Correlated Noise," IEEE Trans. Acous., Speech, and Signal Processing, submitted on May 16, 1987.

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- A.7 C.L. Nikias and R. Pan, "ARMA Modeling of Fourth-Order Cumulants and Phase Estimation, " Signal Processing, submitted on December 20, 1986.

B. Conference Publications

- B.1 C. L. Nikias, "Parametric Trispectrum Estimation," Proc. Third ASSP Workshop on Spectrum Estimation and Modeling, pp. 17-20, Boston, MA, November 1986.
- B.2 C. L. Nikias, and R. Pan, "Nonminimum Phase System Identification via Cepstrum Modeling of Higher-Order Cumulants, Proc. ICASSP '87, Dallas, TX, April 1987.
- B.3 C. L. Nikias and H. H. Chiang, "Noncausal Autoregressive Bispectrum Estimation and Deconvolution" Proc. ICASSP '87, pp. , Dallas, TX, April 1987.
- B.4 C. L. Nikias and R. Pan, "ARMA Modeling of Fourth-Order Cumulants." Proc. Intern. Conf. Signal Process., Florence, Italy, September 1987.
- B.5 C. L. Nikias, "High-Order Spectrum Estimation," Proc. IEEE ASSP Mini Conference, pp. 14-24, Boston, MA, May 1987.
- B.6 C. L. Nikias, "High-Order Spectral Analysis in Signal Processing," Proc. Canadian Centennial Engin. Convention, Montreal, Canada, May 1987.

C. Invited Seminar Talks

- C.1 "Bispectrum Estimation: A Digital Signal Processing Framework" to the Digital Signal Processing Group, Sanders Associates, Nashua, NH, April 1986.
- C.2 "Bispectrum Estimation: A Digital Signal Processing Framework" to the Department of Electrical Engineering, University of Toronto, Toronto, Canada, April 1986.
- C.3 "Higher-Order Spectra and Signal Processing" to the Department of Engineering and Computer Science, Trinity College, Hartford, CT, March 1987.
- C.4 "Nonminimum Phase Communication Channels and Higher-Order Spectra" to the IEEE Communications and Information Theory Chapter, Boston, MA, April 1987.
- C.5 "Nonminimum Phase Signal Reconstruction and Deconvolution" to the High Tech Forums, Network Northeastern, Boston, MA, April 1987.
- C.6 "Higher-Order Spectrum Estimation" Keynote Address to the IEEE ASSP Mini Conference, Boston, MA, May 1987.



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- C.7 "Higher-Order Spectral Analysis in Signal Processing" Invited Address to the Canadian Engineering Centennial Convention, Montreal, Canada, May 1987.
- C.8 "Nonminimum Phase Communication Channels and Higher-Order Spectra" to the Department of Electrical Engineering, Communications Group, McGill University, Montreal, Canada, May 1987.
- C.9 "Higher-Order Spectral Analysis" to the IEEE Oceanic Engineering Society, Canadian Atlantic Chapter, Halifax, Nova Scotia, June 1987.